Remarks: See §3.2.4, example 8, pages 116 till 119

Answers 3.37-1:

a. $I_{zz} = 3,95\times10^{9}\ \text{mm}^4$
b. $I_{\text{p}} = 7,90\times10^{9}\ \text{mm}^4$
c. $I_{\overline{yy}} = 3,95\times10^{9}\ \text{mm}^4$

Explanation:

Take the cross-section as a combination of a square and a circle.
Dimensions in mm:

a. $I_{yy=}I_{zz} = \left\{\frac{1}{12}\times500\times500^3\right\} - \left\{\frac{1}{4}\pi\times200^4\right\} = 3,95\times10^{9}\ \text{mm}^4$

b. $I_{\text{p}} = I_{zz} + I_{yy} = 2\times3,95\times10^{9} = 7,90\times10^{9}\ \text{mm}^4$

c. $I_{\overline{yy}} = 2\times\left\{\frac{1}{12}\times500\sqrt{2}\times(250\sqrt{2})^3\right\} - \left\{\frac{1}{4}\pi\times200^4\right\} = 39,5\times10^{8}\ \text{mm}^4$

Answers 3.37-2:

a. $I_{zz} = 1,55\times10^{6}\ \text{mm}^4$
b. $I_{\text{p}} = 3,10\times10^{6}\ \text{mm}^4$
c. $I_{\overline{yy}} = 1,55\times10^{6}\ \text{mm}^4$

Explanation:

Take the cross-section as a combination of a square and a circle.
Dimensions in mm:

a. $I_{yy} = I_{zz} = \left\{\frac{1}{4}\pi\times(37,5)^4\right\} - \left\{\frac{1}{12}\times15\times15^3\right\} = 1,55\times10^{6}\ \text{mm}^4$

b. $I_{\text{p}} = I_{zz} + I_{yy} = 2\times1,55\times10^{6} = 3,10\times10^{6}\ \text{mm}^4$

c. $I_{\overline{yy}} = \left\{\frac{1}{4}\pi\times(37,5)^4\right\} - 2\times\left\{\frac{1}{12}\times15\sqrt{2}\times(7,5\sqrt{2})^3\right\} = 1,55\times10^{6}\ \text{mm}^4$